

Digital maturity model for universities (MD4U)

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1 Introduction

1.1 What is digital transformation?

The concept of digital transformation has been defined in many different ways, so it is appropriate that the first thing we do is to establish which is our own definition.

Digital transformation is much more than digitalization. According to Senén Barro, "it is important for universities to understand that the path destination must not simply be university digitalization but to become digital universities" (Barro, 2018). We understand by digitalizing the use of information technologies to offer faster and more efficient solutions to existing business needs. However, digital transformation consists of both digitalizing and detecting the potential of a technology to drastically transform business processes or create new services or strategic business processes for the organization based on that technology (figure 1).

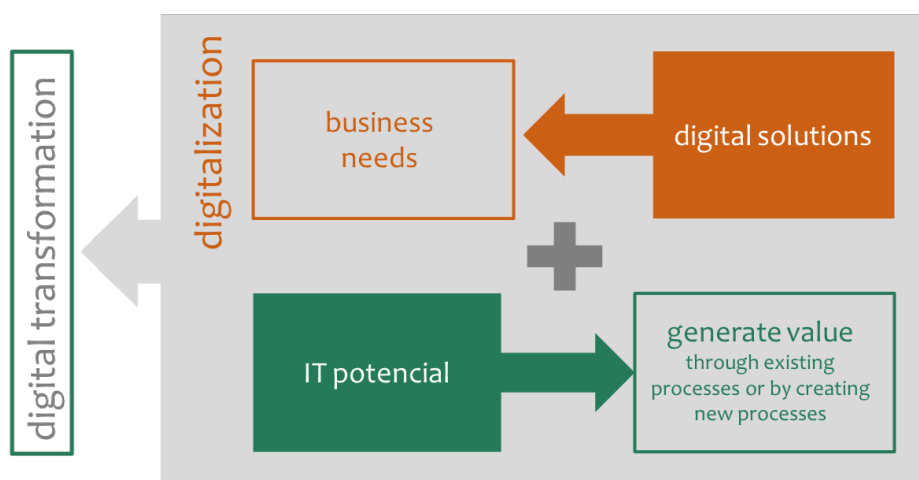


Figure 1. Digital transformation vs Digitalization

In this report we are going to propose a Digital Transformation Maturity Model for Universities (MD4U), bearing in mind that the arguments we are going to provide and the definition of the model will be limited to the university environment, which has very specific characteristics and differs from the rest of the industry sectors. Therefore, the model is going to be valid for this field, but it does not have to be valid for others. However, it can serve as a reference framework and be adapted to the particularities of any sector.

1.2 Background

To present a model approach, it is necessary to address the definition and delimitation of the concept beforehand. Therefore, before considering our own definition and the elements of the MD4U (Digital Maturity for Universities) model, we are reviewing the existing work related to the topic. The digital transformation is a relatively recent term, and therefore there is not yet a consolidated and consensual body of academic documentation. The concept itself is evolving, and there are different points of view, definitions, models and steps for its implementation.

We propose as a starting point the definition of Altimeter in the report *The 2017 State of Digital Transformation* (Altimeter, 2017): “the investment in and development of new technologies, mindsets, and business and operational models to improve work and competitiveness and deliver new and relevant value for customer and employees in an ever-evolving digital economy”. But as the same report says, the definition of digital transformation itself is alive and evolving. This same report also sets out six stages of maturity for digital transformation: business as usual, present and active, formalized, strategic, converged, and innovative and adaptive. In its 2016 report (Altimeter, 2016) it states that these six stages are supported by six pillars: data and analytics, technology integration, digital literacy, customer experience, people and operations, and governance and leadership.

The report *Digital Transformation at the University* (*Transformación digital en la Universidad*, original in Spanish) (Crue-TIC, 2018) presents an adaptation of the RocaSalvatella model (RocaSalvatella, 2016) to the universities, based on six pillars: vision, processes, contact points, services and products, university model and culture and organisation (figure 2). The model proposes two axes of transversal impact that involve the whole university and therefore essential to push the digital transformation (the vision and culture of the organization) and four functional axes (Llorens, 2018).

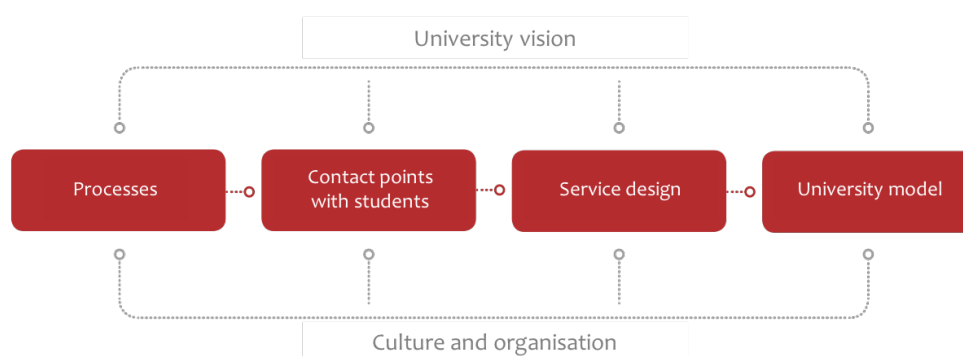


Figure 2. Digital transformation model for the university (Crue-TIC, 2018), adapted and translated from (RocaSalvatella, 2016)

Kähkipuro (2018) presented at EUNIS 2018 the work *Governance framework for digital transformation in higher education*, in which it is proposed the grouping of digital capacities in four clusters with similar government requirements: technical, mainstream digital, evolving digital and opportunistic (figure 3). The technical cluster operates and develops the traditional IT infrastructure. The mainstream digital cluster implements the university's digital strategy (automation and administrative services). The evolving digital cluster uses technology as a source of growth and change. Finally, the opportunistic cluster attempts to identify and develop new capabilities that can bring value beyond the initial exploratory phase. It concludes that “each cluster has its own dynamics and needs to be addressed separately”. To organize these four clusters, two dimensions are used: *external focus* vs. *internal focus*, and *transformation* vs. *business-as-usual*. In figure 4 some examples for universities of these clusters for digital transformation can be seen.

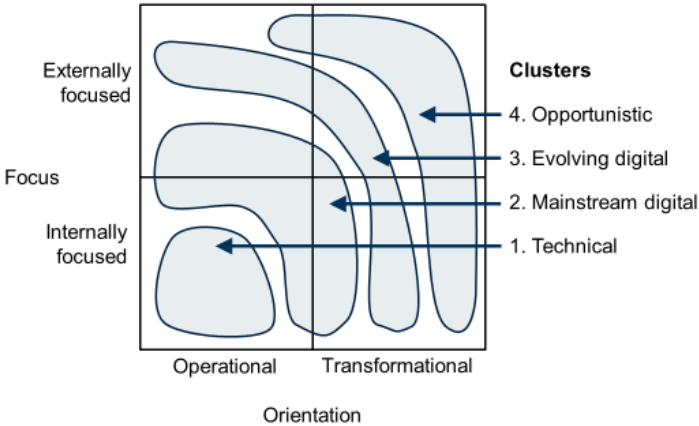


Figure 3. Clusters for digital transformation (Kähkipuro, 2018)

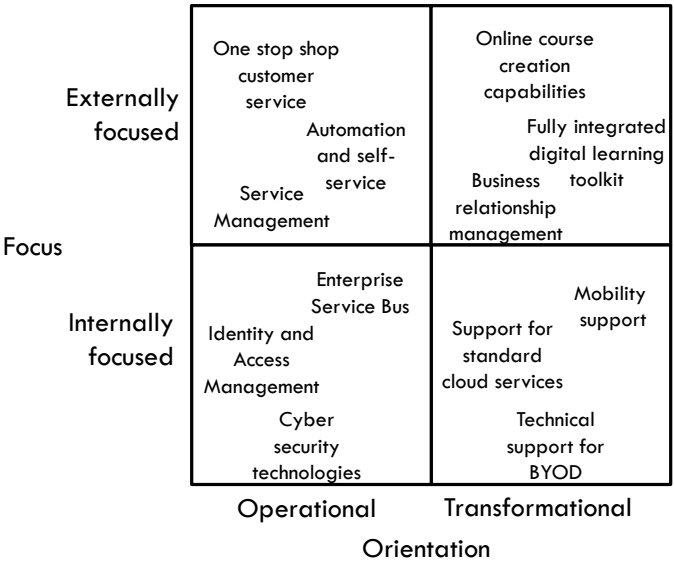


Figure 4. Some examples for universities of clusters for digital transformation (Kähkipuro, 2018)

Digital transformation is not just a technological issue that is solved with an injection of technology. Leadership is also required. According to Barro (2018) "digitizing a university requires mainly an investment effort in infrastructure and ICT resources. However, in order to turn it into a digital university, leadership in ICT is necessary, although not sufficient". He explains it by means of a quadrant in which the ordinate axis represents technological capacity (human resources and technical means) and the abscissa axis represents leadership in IT (figure 5). If neither technological capacity nor leadership are present, the institution has everything to do and does not know what to do. If there are good IT infrastructures, but there is a lack of leadership in IT, the university will work by inertia, following a dynamics from bottom to top, with reactive responses and clear inefficiencies, which represents a loss of opportunities. If there is leadership and strategy, even though resources are scarce, the focus tends to be on transformation processes in the medium and long term, but there will be expectations rather than realities. Finally, the last quarter is the one that makes digital transformation possible. It concludes that "the digital university implies a holistic analysis and transformation of the institution".

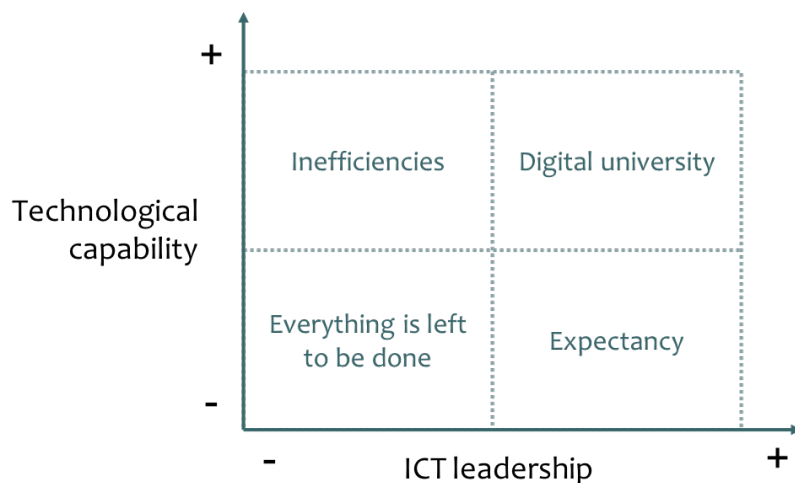


Figure 5. Digital university, adapted and translated from (Barro, 2018)

Once the digital transformation has been characterized, the next question to be asked is how organizations in general, and universities in particular, are approaching it. As already mentioned, Altimeter proposes six stages to trace the roadmap towards the digital transformation that will allow us to "compete for the present while building a next-generation business model to compete for the future" (Altimeter, 2016). According to the Navitas Ventures report Digital Transformation in Higher Education (2017), the majority of university leaders who participated in the study (78%) are opting for a middle ground relative to the change in the current university model, with plans to partially digitize their current operations and at the same time considering the creation of new digital models. This seems a reasonable strategy, as the digital transformation builds on the existing digitization in most universities. In this study, in addition to university leaders, students and education companies participated. While they all agree on the importance of digital transformation, they have divergent viewpoints when it comes to the priorities for change and how imminent the disruption of the traditional university model will be. While current transformational programs tend to focus on

efficient management and digitized learning content, students are more concerned about the skills they will need for their future.

2 Digital Maturity Model for Universities

2.1 Bases of the Maturity Model. Summary of literature

Our model is based on the study of literature and our own experience. The following tables present, as a summary, the elements, dimensions and categories for the digital transformation found in the main literature, which will help us to base our proposal (tables 1, 2 and 3).

Table 1. Summary of elements and characteristics (challenges) of the digital transformation

Altimeter 2017 (definition)	Altimeter 2016 (pillars)	RocaSalvatella (Crue-TIC)	MD4U
<ul style="list-style-type: none"> • New technologies • Attitude • Operational model • Business model • Competitiveness • Value delivery • Customers and employees 	<ul style="list-style-type: none"> • Data and analytics • Technology integration • Digital literacy • Customer experience • People and operations • Governance and leadership 	<ul style="list-style-type: none"> • Vision • Processes • Contact points • Services and products • University model • Culture and organisation 	<ul style="list-style-type: none"> • Digital culture • Business availability • New services • Interaction with students • Quality and competitive training • Knowledge for decision making • Strategic vision of the university

Table 2. Summary of dimensions for digital transformation analysis

Kähkipuro 2018	Barro 2018	MD4U
<ul style="list-style-type: none"> • External focus vs. internal focus, • Transformation vs. business-as-usual 	<ul style="list-style-type: none"> • Technological capacity • IT Leadership 	<ul style="list-style-type: none"> • Capacity to change or create new processes • Capacity to create strategic processes

Table 3. Categories of digital transformation

Altimeter 2017 (maturity stages)	Kähkipuro 2018 (clusters)	MD4U
<ul style="list-style-type: none"> • Business as usual • Present and active • Formalized • Strategic • Converged • Innovative and adaptive 	<ul style="list-style-type: none"> • Technical • Mainstream digital • Evolving digital • Opportunistic 	<ul style="list-style-type: none"> • Digital management • Digital innovation • Digital governance • Digital transformation

2.2 Quadrant of digital transformation

According to the above-mentioned approach, the digital transformation of the business processes of a university will only be achieved if the technologies are disruptive and completely change an existing process or provoke the creation of new services or business processes. Therefore, we understand that the **capacity to change or create new processes** is one of the fundamental characteristics of digital transformation.

When an organization implements new technologies, it can do so in such a way that the result speeds up or makes a process more efficient, but without making it strategic, or it can create a new process that is totally strategic for the organization. For this reason, we understand that the **capacity to create strategic processes** is the other fundamental axis of the digital transformation.

Based on these two dimensions, we have designed a quadrant of digital transformation (figure 6) that establishes the situation of a university in relation to the impact of information technologies. We exclude the case in which the university is not aware of the importance of IT to improve its business processes and therefore does not invest in its implementation. On the contrary, we start from the assumption that the university wants to make an explicit commitment to information technologies. We establish four levels:

- **Digital management:** technologies help to make existing business processes more efficient, but they are not strategic for the university.
- **Digital innovation:** technologies make it possible to create new business processes or disruptively transform existing ones, but without turning them into strategic processes for the university.
- **Digital governance:** technologies are applied to existing business processes but when properly governed they become strategic for the university.
- **Digital transformation:** the high potential of a new technology causes the creation of new disruptive and strategic business processes for the university.

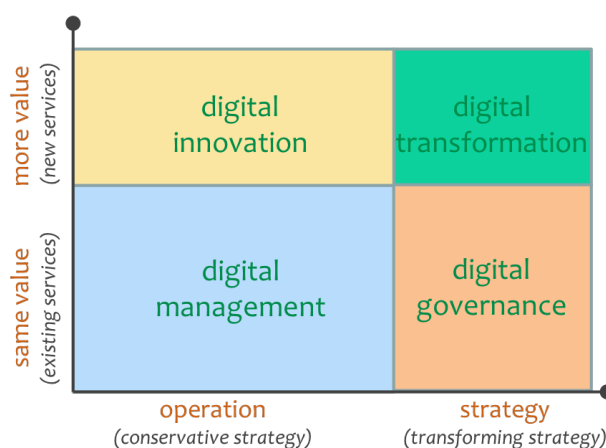


Figure 6. Quadrant of digital transformation

In our experience, the number of strategic processes is less than the number of operational processes in a university. We also think that technologies will support more existing processes than create new disruptive processes. Therefore, the quadrants we

propose have different sizes. The largest is the one referring to digital management because we understand that it is the most common way in relation to the implementation of IT in the university. Then we find similar sizes to innovation and digital government because these modes are less common than management, but more frequent than transformation. Finally, digital transformation occupies the smallest area because it is more difficult for universities to achieve this mode and therefore less frequent.

These statements are still a generalization that will have to be adapted to the specific situation of each university. For example, if all or most training in a university is online with very little classroom instruction, then the digital transformation must be a more common way than the one shown in figure 6. The quadrants of innovation and digital government will be larger, since emerging technologies are a core part of its business and therefore need to be governed from the top.

2.3 Route for digital transformation

A question could be posed: can a university reach very high levels of maturity (e.g. even digital transformation) without going through lower levels? It could be possible, but it is not the norm. Normally it takes a lot of time and resources to mature at the lower levels in order to reach the higher levels. The route for digital transformation depends on the university **leadership** and **strategy** (those responsible for it).

Regarding **leadership**, those responsible for digital management are the IT technicians and the functional managers of the university services. These are the ones who have to design efficient technological solutions based on the knowledge about technology and about business that different people have. Digital innovation must be reached thanks to the decisions taken by the IT Director and the directors of the other university services. They are the ones who should approve the implementation of new services which, although not strategic, contribute to making the university more efficient. Finally, those responsible for governing IT and for making decisions that digitally transform the university's business cannot be other than high-level executives. In the case of the university, and depending on its organizational structure, it will be the rector and/or the general director and the rest of its government team (figure 7).

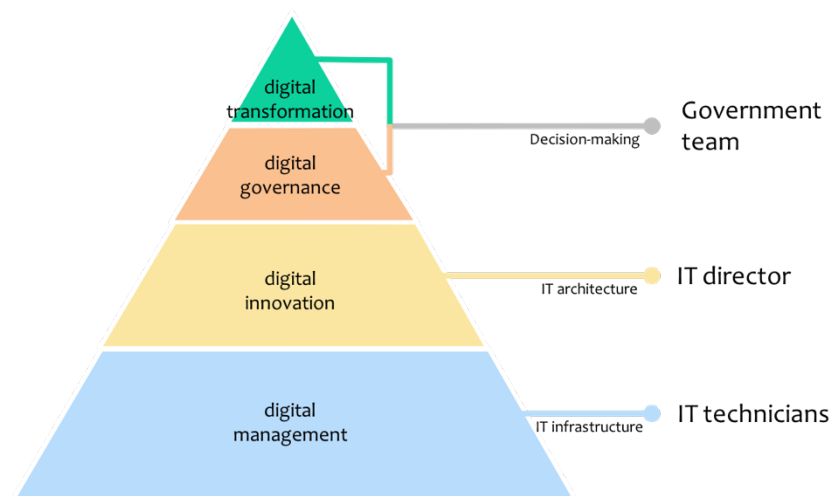


Figure 7. Decision-makers in relation to digital transformation

As for the **strategy** we have (figure 8)::

- **Conservative strategy:** the university's investment in IT is characterized by being scarce and is reduced to digitizing existing business processes, implementing technologies widely used in other universities.
- **Innovative strategy:** the university keeps many processes in management mode, but it also tries to use technologies to innovate in its key processes. It can also begin to organize its IT-related decision making and design medium-term strategies, thus progressing towards good digital governance.
- **Transformative strategy:** this strategy is typical of a leading university that wants to become a market reference and obtain the greatest competitive advantage in relation to the rest of the universities.

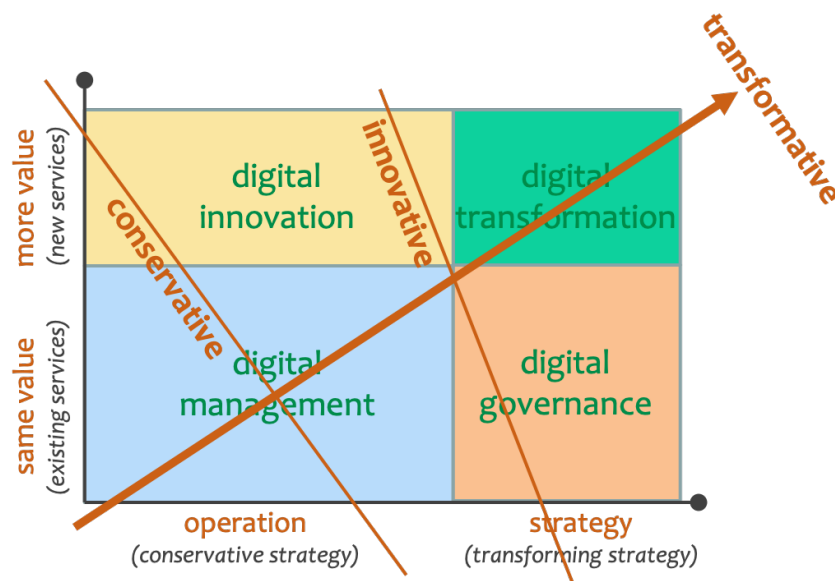


Figure 8. Route for digital transformation

2.4 Analysis of the digital transformation maturity of a university

The Digital Maturity Model for Universities (MD4U) aims to become the reference of a framework that includes a set of good practices that every university must satisfy to reach maturity in the four modes proposed in the model.

The objective of the MD4U Framework is to measure whether a university dedicates more resources to one mode or another. For example, a university that presents the modes of IT implementation shown in Figure 9 would be a university that is very concerned with digital management (70%), with quite a few digital innovation processes (20%), but with hardly any digital governance (8%) and an almost non-existent digital transformation (2%). The sum of these percentages adds up to 100% of the resources that the university dedicates to its IT.

The MD4U Framework should help the university to determine the current situation for its IT, but also to identify the good practices that should be implemented to increase its maturity in the required areas. Thus, it could transfer its resources from management or innovation to governance and digital transformation. We consider that in order to

achieve this, the university must adopt an innovative attitude towards IT and assume the risks of being more cutting-edge than now in the implementation of new business processes based on technological trends.

Only universities that implement this type of strategy will be able to lead the digital transformation and gain a competitive advantage over universities that do not.

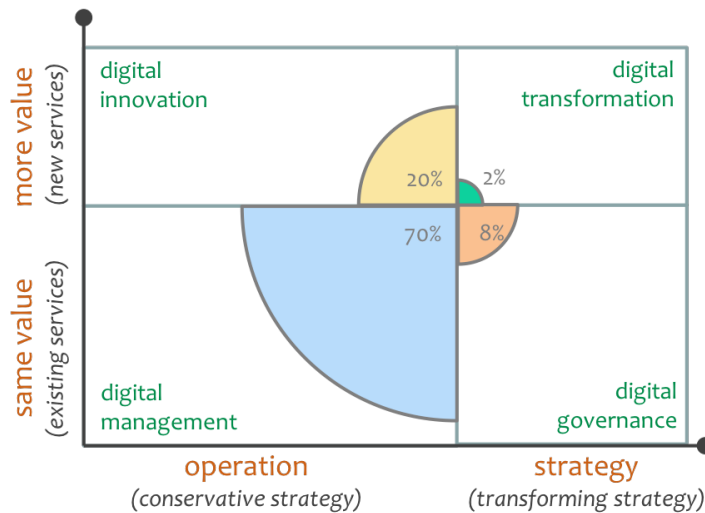


Figure 9. Distribution of IT maturity in an example university

We consider that the ideal distribution of the IT resources of a university should have a balance in the four quadrants, similar to the one shown in figure 10. In this situation, the university would be devoting about half of its efforts to digital management (50%) but would distribute the rest in a balanced way between innovation and digital government (20%), dedicating the remaining 10% to digital transformation. We warn again about the risk of generalizing these numbers to all universities because there are universities that, by their nature, bet on increasing the percentage dedicated to transformation and others whose conservative strategy may lead them not to reach the proposed percentage.

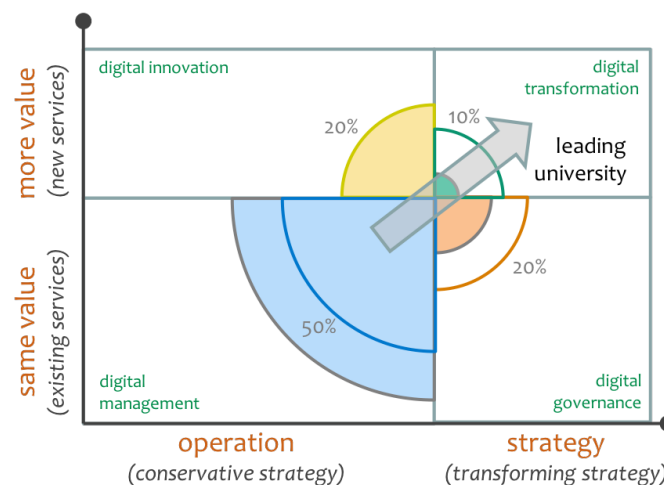


Figure 10. Digital maturity goal in an example university

3 MD4U Framework

For the MD4U Framework to become a useful tool for diagnosing current maturity, it must establish improvement goals and understand which the best practices are to implement to increase the digital transformation maturity of a university. This is why it has been structured in the following levels (figure 11):

- **Strategic challenges:** these are the 7 IT-related challenges that a rector faces in achieving the business strategies of the university through the use of IT.
- **Strategic areas:** each challenge will be met if the university meets several areas related to that challenge (ranging from 2 to 5 areas per challenge). A total of 22 areas are proposed.
- **Strategic objectives:** each area will reach maturity as the associated strategic objectives are satisfied (no more than 5 objectives per area is recommended).
- **Maturity of the objective:** at this level, all the indicators and good practices are grouped according to the mode of IT they intend to measure (digital management, digital innovation, digital governance or digital transformation).

After an intense process of analysis of the literature, review of analysis models, planning, governance and digital transformation, and based on the authors' own experience, we have defined the framework presented in this document. Specifically, the UNIVERSITIC (Gómez, 2017), BenchEIT, ANUIES-TIC (Ponce, 2018) and UETIC (Padilla et al., 2017) studies have served as a starting point.

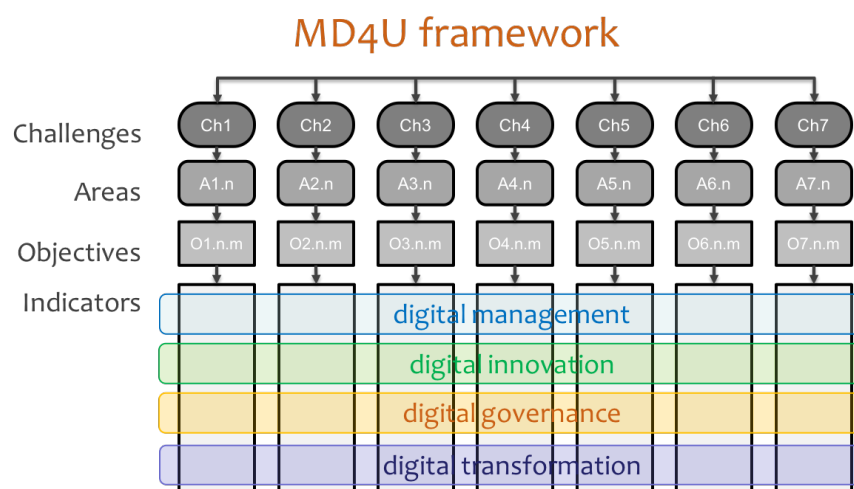


Figure 11. MD4U Framework

MD4U Framework is under a validation process by researchers and expert professionals of renowned prestige. This process is being carried out in two phases:

- **Phase 1:** validation of the general approach, quadrant, maturity model, strategic challenges and areas. This phase has been carried out and the results of the validation are those presented here.
- **Phase 2:** once the model has been revised in the light of the comments of phase 1, the strategic objectives and indicators (structured according to the

MD4U quadrant) are undergoing the validation process during the writing of this document.

3.1 Strategic Challenges

The first level of the MD4U Framework includes the 7 major challenges that every Rector should face in order to achieve good IT governance, assuming an innovative attitude in relation to how IT can transform their university. These challenges are of the utmost importance, as they have an impact on the business objectives, i.e. the mission, of the university. These strategic challenges are (figure 12):

Ch1. Extend digital culture among the university community

Increasing the level of digital skills and digital culture of the university community (teachers, students, administrators, technicians, managers, etc.) should reduce resistance to change and facilitate the implementation of digital transformation initiatives.

Ch2. Maintain business and optimize information security

The first concern of a Rector should always be that IT works properly, is continuously available and maintains the highest possible level of security. Without these premises the digital transformation would be difficult to achieve.

Ch3. Obtain competitive advantage thanks to quality services

If a university is committed to digital transformation, then IT should strengthen existing management processes and create new processes. It should result in university services reaching the highest level of quality and this will differentiate them from those offered by other universities. In few words, it will provide competitive advantage to the university.

Ch4. Offer quality and competitive instruction

IT, in digital transformation mode, should be the tool that drives training content to new formats and communication channels while facilitating the implementation of new teaching methodologies. The highest levels of quality will be achieved when each student is offered personalised training processes according to their needs and interests. In this way, the university can become a reference in training, at least in those strategic areas for the institution.

Ch5. Satisfy emergent demands of clients (students)

Achieving maximum student satisfaction in relation to their learning process and the university services received undoubtedly means having the best communication and maximum interaction with them. At the level of digital transformation, this interaction will be carried out in a personalised way and adapted to the needs of each university student. In addition, channels of communication between the whole university community and society should be established.

Ch6. Have the knowledge and information for decision making

The university should analyse and exploit its information to obtain precise knowledge from it so that it can help make decisions, especially strategic ones. In the digital transformation mode, business intelligence should be an essential ally of the university's governing teams and managers.

Ch7. Fulfil the strategic objectives of the university (vision)

It is only understood that the government team invests in digital transformation if it does so with the aim of achieving the vision of its university. Digital transformation initiatives will only be effective if they contribute significantly to meeting strategic objectives, and those that are not aligned with the strategy should not be undertaken.



Figure 12. Strategic challenges of the digital transformation in a university

3.2 Strategic areas

Challenges include the main strategic areas that must be met to reach the desired digital maturity. Below we propose the areas associated with the 7 challenges presented above.

Ch1. Extend digital culture among the university community

A1.1. Training in digital competences

A1.2. Strengthening the digital culture

Ch2. Maintain business and optimize information security

- A2.1. Providing the necessary and well-distributed resources
- A2.2. Maintaining continuity and recovering services as soon as possible in the event of a serious incident
- A2.3. Reaching the optimal security level to keep information safe

Ch3. Obtain competitive advantage thanks to quality services

- A3.1. Efficiently delivering all IT-based services needed by users
- A3.2. Boosting the performance and quality of services through technologies
- A3.3. Optimizing outsourced services and the relationship with suppliers
- A3.4. Complying with regulations and incorporating standards

Ch4. Offer quality and competitive instruction

- A4.1. Promoting new models of face-to-face training through technology
- A4.2. Strengthening distance learning through disruptive technologies

Ch5. Satisfy emergent demands of clients (students)

- A5.1. Achieving global communication with all university students
- A5.2. Establishing a personalized interaction with each student
- A5.3. Optimizing customer satisfaction (measuring)

Ch6. Have the knowledge and information for decision making

- A6.1. Having the information of the whole university in digital and integrated support
- A6.2. Gaining knowledge that supports decision-making
- A6.3. Exchanging information with other entities efficiently

Ch7. Fulfil the strategic objectives of the university (vision)

- A7.1. Achieving good IT governance
- A7.2. Prioritize the most strategic IT projects
- A7.3. Promoting the digital transformation of the business
- A7.4. Fostering collaboration to achieve common objectives in digital transformation
- A7.5. Offering new business lines driven by disruptive technologies

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